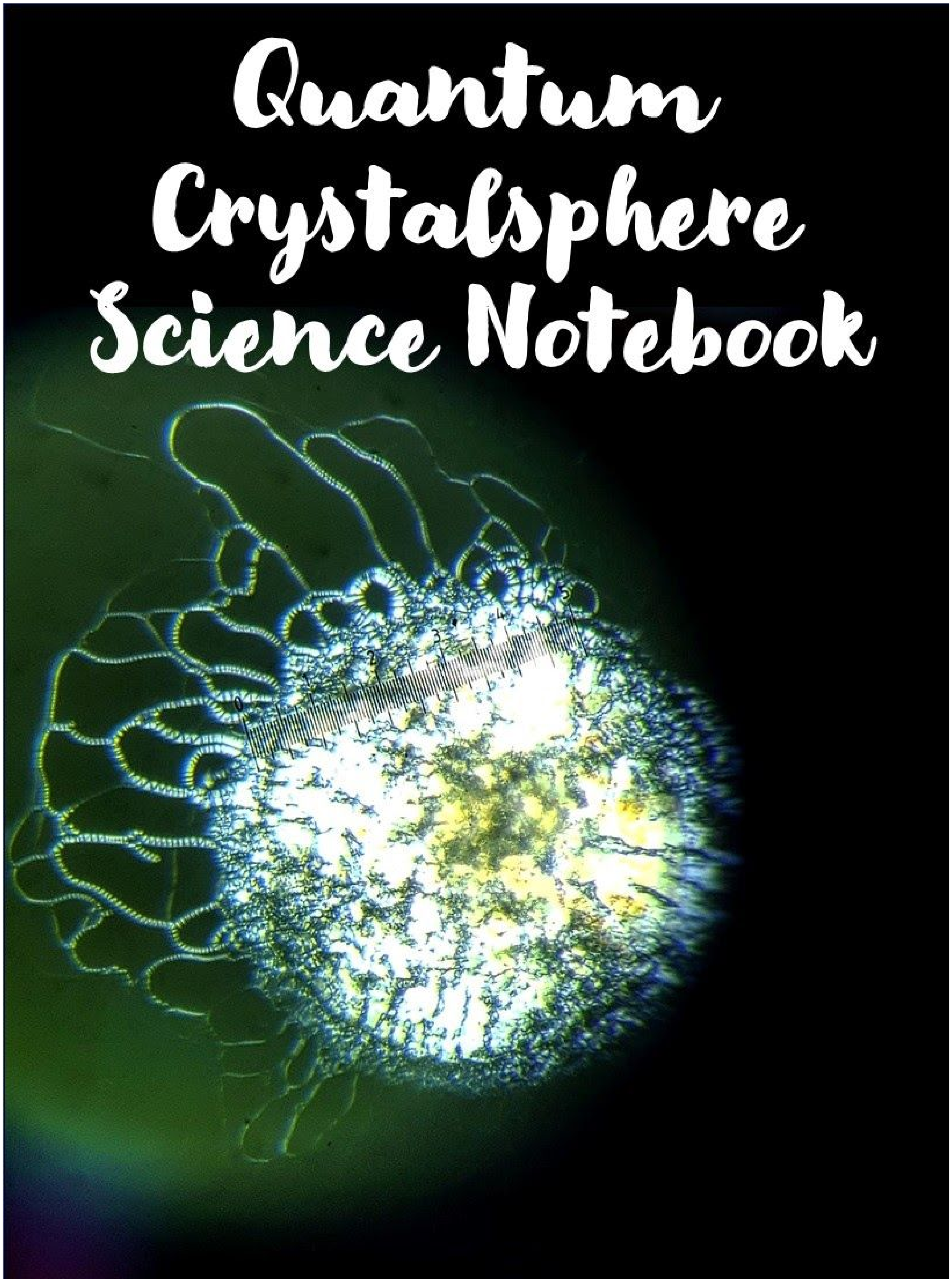
# Quantum Crystalsphere Science Notebook



# LABORATORY NOTEBOOK

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# Writing a Scientific Laboratory Report

## *Components of a Laboratory Report*

- Title
- Abstract
- Introduction
- Method
- Results and analysis
- Discussion
- Conclusion
- References
- Appendices

## *Title*

Your title needs to reflect the purpose of the experiment.

## *Abstract*

An abstract provides a brief overview of the experiment, including its findings and conclusions. In general the abstract should answer six questions:

- **Why was the experiment conducted? (big-picture/real-world view).**
- **What specific problem/research question was being addressed?**
- **What methods were used to solve the problem/answer the question?**
- **What results were obtained?**
- **What do these results mean?**
- **How do they answer the overall question or improve our understanding of the problem?**

The most important thing to remember when writing the abstract is to be brief and state only what is relevant. No extraneous information should be included. It also must be clear enough so someone who is unfamiliar with your experiment could understand why you did what you did, and the conclusions you reached, without needing to read the rest of the report.

An abstract is usually only one paragraph (200-300 words max).

Note: An abstract should be written last (even though it appears as the first section in your report), as it summarises information from all the other sections of the report.

## *Introduction*

The **Introduction** should:

- provide the context and motivation for the experiment
- briefly explain relevant theory in sufficient detail
- introduce any relevant laws, equations or theorems
- clearly state the aim or research question that the experiment is designed to address.

Notes:

- Always write the introduction in your own words; don't just copy from the lab notes.
- Some brief lab reports do not require an introduction and will just begin with an aim/statement.
- Always check with your lecturer/demonstrator if you're not sure what is expected.

## *Method*

The method section is where you describe what you actually did. It includes the procedure that was followed. This should be a report of what you *actually* did, not just what was *planned*. A typical procedure usually includes:

> How apparatus and equipment were set up (e.g. experimental set-up), usually including a diagram,
> A list of materials used,
> Steps used to collect the data,

Any experimental difficulties encountered and how they were resolved or worked around.

If any aspects of the experimental procedure were likely to contribute systematic error to the data and results, point this out in sufficient detail in this section.

### *Experimental set-up and materials*

Your description of the experimental set-up should be sufficient to allow someone else to replicate the experiment themselves. You will usually begin with a description of the materials used and/or the apparatus set-up accompanied by:

- an image showing the relevant features of any object or material under investigation
- a diagram of the experimental setup, with each component clearly labelled

### *Procedure*

When you carry out an experiment, you usually follow a set of instructions such as these, which may include extra information to guide you through the steps.

Notes:

When writing up the procedure, you must report what was actually done and what actually happened, and omit any extra information such as helpful hints included in the instructions. Your goal for this section should be to include enough detail for someone else to replicate what you did and achieve a similar outcome. You should also explain any modifications to the original process introduced during the experiment.

In the **Procedure** section you should use:

- the ***past*** tense when you are reporting on something you did.

While most science units require that you report in the **passive voice**, some require the **active voice**. In the example below, the first person is used e.g. "we initiated". This is accepted in some disciplines, but not others.

## *Results and analysis*

In this section, you present the main data collected during your experiment. Each key measurement needs to be reported appropriately. Data are often presented in graphs, figures or tables.

This section often also includes analysis of the raw data, such as calculations. In some disciplines the analysis is presented under its own heading, in others it is included in the results section. An analysis of the errors or uncertainties in the experiment is also usually included in this section.

## *Tables, graphs and figures*

Most numerical data are presented using tables or graphs. These need to be labelled appropriately to clearly indicate what is shown.

## *Titles and captions*

- Tables should be labelled numerically as Table 1, Table 2, etc.
- Everything else (graphs, images, diagrams etc.) is labelled numerically as Figure 1, Figure 2, etc. (References to figures in the main body of the text are usually written in abbreviated form, e.g. ‘see Fig. 1’).
- Table captions appear **above** the table. Figure captions appear **below** the figure.

## *Discussion*

The discussion section is where you:

- comment on the results you obtained
- interpret what the results mean
- explain any results which are unexpected.

Your discussion section should demonstrate how well you understand what happened in the experiment. You should:

- identify and comment on any trends you have observed
- compare the experimental results with any predictions
- identify how any sources of error might impact on the interpretation of your results
- suggest explanations for unexpected results, and
- where appropriate, suggest how the experiment could have been improved.

## *Conclusion*

The conclusion section should provide a take-home message summing up what has been learned from the experiment:

- Briefly restate the purpose of the experiment (the question it was seeking to answer)
- Identify the main findings (answer to the research question)
- Note the main limitations that are relevant to the interpretation of the results
- Summarise what the experiment has contributed to your understanding of the problem.

## *References*

It is quite possible that you may have in-text citations in your lab reports. Typically these will be included in the **introduction** to establish evidence of background for current theories or topics. Your **discussion** section will often include in-text citations, to show how your findings relate to those in the published literature, or to provide evidence-based suggestions or explanations for what you observed.

When in-text citations are incorporated into your lab report, you must always have the full citations included in a separate reference list. The reference list is a separate section that comes after your conclusion (and before any appendices).

Check your lab manual or unit guide to determine which referencing style is preferred. Carefully follow that referencing style for your in-text references and reference list.

The following is an example of a reference list based on the in-text citations used in the Introduction and Conclusion sections in this tutorial. It has been formatted in accordance with the CSIRO referencing style.

References

Jones T, Smith K, Nguyen P, di Alberto P (2017) Effects of habitat overlap on population sampling. *Environmental Ecology Journal* ***75,*** 23-29. doi: 10.5432/1111.23

Tian M, Castillo TL (2016) Solar heating uptake in Australia: rates, causes and effects. Energy Efficiency Reports. Report no. 10, The Department of Sustainability and Environment, Canberra.

## *Appendices*

An appendix (plural = appendices) contains material that is too detailed to include in the main report, such as tables of raw data or detailed calculations.

Each appendix must be:

- given a number (or letter) and title
- referred to by number (or letter) at the relevant point in the text.

# Quantum Crystallography Introduction

## *Scientific Universal Creative Force of Crystallization*

Crystallization is the art and science of promoting a phase transition from the liquid state into a highly ordered crystalline or solid state. Crystalline solids are one of several conventional classifications of phases of matter, which include plasma, gas, liquid, and crystalline solid states. The continuous process of transitioning between these phase states describes a gradual progression of condensing vibration and particles into higher degrees of structure and order. Although, as scientific research is elucidating, these states of matter actually represent a much more fluid and dynamic continuum or matrix of phases and structure with different properties. For example, the ubiquitous molecule of water adopts a dynamic infinite range of structures that can grouped within the liquid phase, such as the quasi-crystalline phase of EZ water with layers of hexagonal hydrogen bonding between water molecules with the chemical composition H3O2 to produce a highly viscous phase that excludes bulk water and creates charge separation to conduct electrical current and harvest energy at no cost.

Another fascinating example of dynamic phases is observed with lipid molecules, which self-associate into diverse liquid crystalline structures of micelles, bicelles, bilayers, liposomes, and lipidic cubic phases. Micelles adopt a spherical single layer of lipid with the hydrophilic carbon chains of the lipids oriented inward and polar heads are oriented outwardly to interact with hydrophilic water. When micelles passes critical threshold of lipid, a bicelle is produced, which generates a lipid bilayer or an elongated plane of lipids with curved edges as the hydrophobic lipid tails are oriented inward to be shielded from polar water by the polar lipid head groups. The planar bilayer can curve and fuse to create a spherical liposome that is 100’s of nanometers in diameter and contains aqueous solution to suspend and encapsulate molecules to reconstitute a favorable environment for catalytic reactions. A continuous bilayer is observed in all cell membranes to compartmentalize specialized physiological processes and enzymatic reactions with cells, which are on the scale of 10-100 micrometers in diameter. Additional crystalline structures can be assembled with lipids under laboratory environments, such as the lipidic cubic phase, which produces a lipid phase with high curvature that creates two separate continuous solvent channels. The lipidic cubic phase is used by crystallographers to crystallize membrane proteins and macromolecular assemblies that are natively found in the cell membrane. So, as you can see, nature has no limitations in the number of intricate, energetic structures that it creates to accomplish diverse biological functions.

The conventional phases of matter fall along a continuous spectrum that describes a gradual progression of condensing vibration and particles into higher degrees of structure and order. To briefly introduce this spectrum of phases, plasma is the fourth fundamental state of matter that is generated from extremely high temperature fusion reactions near the Sun. During these fusion reactions, hydrogen atoms are converted to a freely, roaming ionized gas and release energy as radiation, photons of light, charged particles, negative electrons, positive ions, and negative ions. The charged particles within plasma confer electrical and conductive properties. Examples of plasma in nature include the tails of comets, solar winds that contact the Earth's magnetosphere to create the aurora borealis, static electricity, as well as lightning, which introduces an input of energy to ionize air or gaseous phase and produce plasma that travels along fractal paths following charged particles that carry the plasma current to the ground. Notably, plasma is the most abundant phase, accounting for 99.9% of matter of the universe. A study by the International Space Station showed that dust microparticles within plasma become highly charged and interact strongly with each other to create liquid or crystalline behavior in space, which demonstrates the universal force of crystallization in action across the spectrum of matter phases.

The fundamental gaseous phase of matter is generated when the thermal mobility of molecules or atoms is strong enough to allow free motion and exceed cohesive forces of charged particles. In other words, a gas has no fixed volume or fixed shape. The properties and behavior of a gas can be characterized by its volume, temperature, number of particles, and pressure. The gaseous phase is everywhere in the universe, such as nebulae in astronomy, which are clouds of gas that exist between stars and galaxies (Butterfly nebula, mystic mountain). Stars are spheres of plasma held together by gas pressure that is pushing outward to balancing inward pulling gravitational forces. Interstellar space has on average 1 particle per cubic centimeter volume of space. The Earth's atmosphere is a 100 kilometer layer surrounding the planet that is composed of gas molecules, nitrogen, oxygen, argonne, carbon dioxide, and blocks the Earth from harmful radiation from the Sun. The density of the Earth's atmosphere is approximately 50 billion billion particles per cubic centimeter volume of space. And there are even entire planets composed of gas, such as Jupiter which is the largest planet of our solar system within the Milky Way Galaxy that is composed entirely of hydrogen, helium, trace gases of methane, ammonia, and water.

The fundamental Liquid phase of matter is formed when molecules interact through cohesive forces. The liquid state of matter is only slightly Compressible, has medium to high density, adopts a fixed volume under constant temperature and pressure, and changes its shape to conform to the shape of its container into the most compact shape possible. The liquid phase is formed through Intermolecular forces, such as van der waals, which consists of both london dispersion forces that are interactions mediated by transient charges of cluster of electrons, as well as dipole-dipole forces, which balance attraction or repulsion between partial opposite charges. Hydrogen bonding is a type of dipole-dipole force in which a hydrogen atom bonds to a strongly electronegative element, such as Oxygen, Bromide, or Fluorine. Cohesive forces within liquids create properties such as surface tension, where objects can rest on top of a liquid as long as the weight does not exceed the strength of the intermolecular forces; Capillary action, where molecules within the liquid are attracted to molecules in the container creating a meniscus, and also viscosity, which is due to a large number of hydrogen bonds creating strong intermolecular forces, as observed in honey, oil, and EZ phase water.

The fundamental Crystalline state of matter is generated by orderly arrangements of electrons, chemical bonds, and intermolecular forces. Crystalline solids can have physical properties of being flexible, malleable, or rigid according to the density and chemical bonding of atoms within the crystal, as well as energetic properties according to the pairing of electrons in the orbitals of adjacent atoms, called electron orbital hybridization, to form atomic bonds and determine how the electrons flow within the crystalline structure. A crystalline solid can be easily broken along planes of molecular or atomic contacts within the orderly crystal lattice to create perfectly smooth facets. This property is called anisotropy, or breaking differently depending on which plane is contacted by force. There are several types of crystalline solids, including molecular crystals, ionic crystals, and atomic crystals. Molecular crystals are formed by covalent-bonded molecules to create an orderly structure as they solidify, while the molecules remain unchanged Examples include water ice and protein crystals, and these molecular crystals tend to be very soft and have low melting points due to weak intermolecular contacts. Ionic crystals are solids of ionic compounds, such as NaCl or salt, and they are soluble in polar solvents and have high melting points. Atomic crystals are formed from individual atoms and consist of three subclasses, including network crystals, group 18 crystals, and metallic crystals. Network crystals, such as diamonds, have a rigid crystal structure composed of atomic networks connected by different bond lengths and strengths. The arrangements of atoms with different bond lengths and strengths facilitate electron orbital hybridization of atomic networks to determine physical and energetic properties. Group 18 crystals are created with noble gases using weak van der waals forces, making these crystals quite unstable; they usually only crystallize in a laboratory environment. Metallic crystals have the closest atomic packing arrangements, creating a strong bonding with a sea of electrons. The fluidity of electrons creates flexible bonds, which make these crystals malleable, ductile, and imbue conducting properties from the flow of electrons. Metallic crystals have the same bond lengths and strengths, which create defined melting temperatures. Lastly, solids can be amorphous, meaning that they have no orderly pattern. There is a range of strength of bonds holding the atoms together, so, there is no discrete melting temperature, but the solid melts anisotropically or in a non-uniform way, as the appropriate energy threshold is met.

## *The Phase Diagram*

The dynamic matrix of phases of matter for a defined chemical composition can be visualized and interpreted using a Phase Diagram. The matter phase transitions are driven by energy minimization, and the curves in the diagram indicate the precise physical parameters, such as pressure, temperature, and chemical environment, that promote formation of different forms of matter. The classifications of phase transitions include condensation, sublimation, melting or fusion, and crystallization.

If we begin in the gaseous phase, a vapor or gas can be converted into a liquid through the phase transition of condensation. This phase transition is reversible through vaporization, which converts a liquid into a vapor. The gaseous phase can also be directly transformed into a solid without passing through the liquid phase through the deposition or desublimation phase transition. Conversely, sublimation is the transition of a substance directly from a solid phase to a gas or vapor state. Finally, crystallization is the phase transition that forms a highly ordered solid, where the atoms or molecules are organized into a structure known as a crystal. Crystals commonly form through precipitation of a solution, which depends on solubility and concentration of chemical components, freezing, which depends on temperature, or more rarely deposition directly from a gas, which depends on pressure. The rate of crystal growth is determined by the initial conditions and how far away they are from the final energy minimized crystalline state. The crystallization phase transition is reversible by using temperature to introduce energy to overcome cohesive forces of the crystal lattice.

## *The Crystallization Experiment*

Crystals are grown through the crystallization process, which includes a two-step process of nucleation of the unit cell followed by crystal growth. We can visualize the crystallization process on a reaction coordinate that tracks energy over time to understand how energy minimization drives the phase transition from a liquid to a solid, crystalline phase. In the first step of nucleation, single molecules in a liquid phase self-associate to form molecular interactions that balance attractive and repulsive forces of positive and negative charges and electrons. These critical aggregates produce a symmetrical arrangement of atoms that creates the geometry of the unit cell. At this point, the crystallization reaction crosses a critical energy barrier to initiate crystal growth. The resulting stable nuclei or unit cell memory unit that is used to systematically incorporate molecules to build the crystal lattice and increase the dimensions of the crystal facets until an energy minimized state is reached. Since the crystal is constructed by geometric unit cells of atoms where each lattice point of the unit cell defines an identical energetic environment, all points within the crystal lattice contain information about the whole crystal structure, making the crystal fractal and holographic. As you can see with the examples of the Cubic NaCl crystal constructed with a cubic unit cell and the Hexagonal Quartz crystals constructed with the trigonal/hexagonal unit cell, the fractal and holographic geometry of the nanometer-sized unit cell memory unit is mirrored in the macroscopic geometry of the fully grown crystal.

The traditional crystallography process begins with exploring a broad matrix of physical variables to identify ideal conditions to produce a crystal. These ideal conditions shift the energetic landscape of the experimental system into the nucleation zone to form the unit cell and promote crystallization. This energetic trajectory to the nucleation zone is most frequently driven by increasing the concentration of molecules in a solution by evaporating water to drive self-association and cohesive interactions at low energy binding sites, which form critical bond length and angle dimensions to construct the unit cell. The stable nuclei contain a low energy atomic binding pattern of the unit cell that creates the crystal structure geometry. The nuclei then enters the crystal growth phase, in which molecules or atoms that are randomly oriented in liquid solution are systematically incorporated into the crystal lattice through a spiral trajectory of occupying low energy sites. Scientists can control the experimental parameters to slow the rate of nucleation or crystal growth to improve the organization of atoms of molecules into the ordered, crystalline array, or which improves the quality of the crystal lattice. The atomic structure and quality of the crystal lattice creates unique properties of the crystal. The internal symmetry absorbs the vibrations of the forces that exist in and around it in the environment as it is crystallizing; so the crystal is essentially a record keeper, library, or memory storage system. Likewise, imperfections within the crystal lattice will absorb energy and confer different properties.

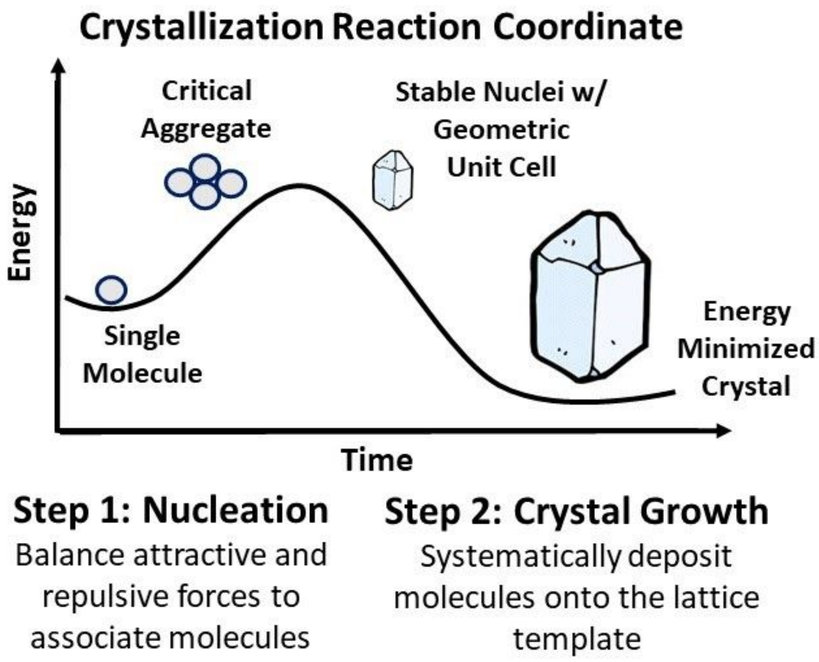
Crystallization Reaction Coordinate
Energy
Time
Critical Aggregate
Stable Nuclei w/ Geometric Unit Cell
Single Molecule
Energy Minimized Crystal
Step 1: Nucleation
Balance attractive and repulsive forces to associate molecules
Step 2: Crystal Growth
Systematically deposit molecules onto the lattice template

**Figure 4. The Universal Creative Force of Crystallization. The nucleation phase generates fundamental geometric unit cell, followed by the crystal growth phase, which systematically deposits atoms into the crystal lattice template.**

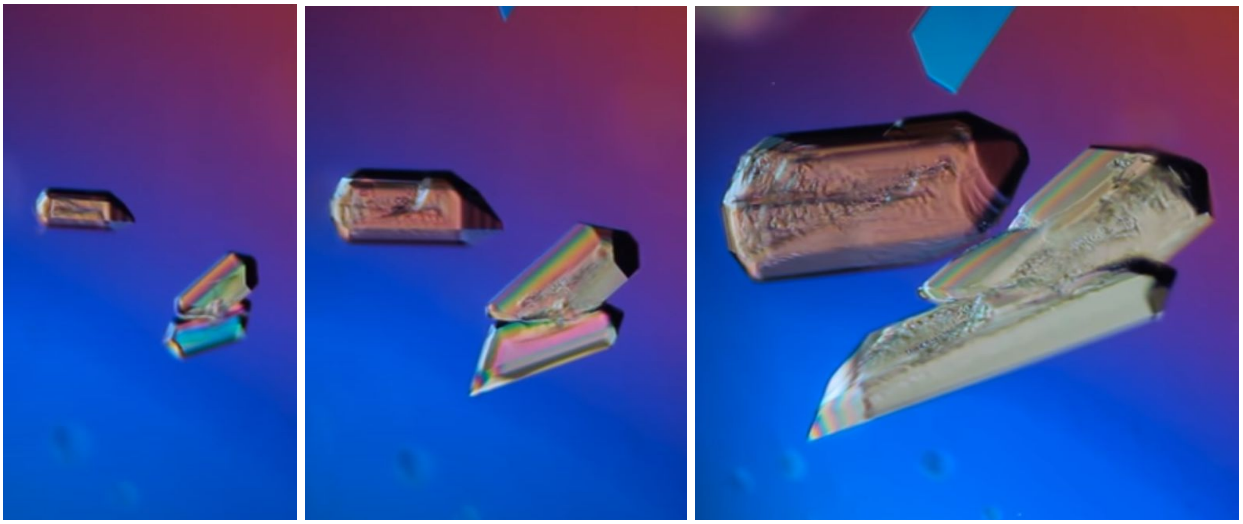

**Figure 5. Timelapse of the Crystal Growth Phase. Light microscopy images of protein crystals growing in solution over 30 seconds time.**

## *The Seeding Experiment --- Memory Unit for Information Storage*

The information memory storage capacity of the unit cell can be demonstrated with a Seed Crystallization Experiment. We can visualize and compare a traditional and seed crystallization experiment through a Phase Diagram, which is shown in the center figure. The Phase Diagram shows the ideal conditions for nucleation to occur in the Nucleation Zone and subsequently transition to crystal growth in the Metastable Zone, which define the 2 steps of the liquid-to-crystalline phase transition. Any changes in the environmental or physical conditions during crystallization, such as temperature, pressure, electromagnetic fields, molecule concentration, or atomic composition, will be reflected in the propensity of the sample to crystallize, as well as in the final order of the crystal lattice. In a traditional crystallization experiment, a wide range of experimental conditions must be sampled to avoid amorphous precipitation or undersaturation in order to identify the ideal conditions to reach supersaturation and promote crystallization. However, during a Seed Crystallization Experiment, an existing crystal lattice is crushed into microscopic fragments that contain the unit cell memory unit, called crystal “seeds” or “nuclei.” The Crystal seeds are then placed into a solution that produces conditions within the metastable zone of the crystallization phase diagram. The crystal seeds or nuclei promote crystallization while bypassing the energetic requirement for nucleation in the supersaturated zone. The resulting fully grown, energy minimized crystals contain the identical macroscopic morphology of the original crystals since they share the identical geometric unit cell memory unit that contains all of the information to guide and structure the crystallization process.

An alternative mechanism for the Seed Crystallization Experiment has been proposed by Rupert Sheldrake, which states that the geometry of the atomic arrangement within crystal lattice creates a non-local energy blueprint through morphic resonance to transmit or receive information from the quantum field and structure local energetic fields to drive the crystallization process. Interestingly, the outcomes of the Seed Crystallization Experiment also confirm that crystals meet the 3 criteria for life, including the ability to store meaningful information, to replicate and propagate information, and to persevere and mutate information to evolve.

## *Defining Features of a Crystal & Energy Transfer*

What is a “Crystal”? By definition, a crystal is an arrangement of atoms that is repeated periodically in 3D; Periodicity or the repeating pattern is the key defining feature.
The fundamental, repeating building block that constructs the crystal is called the unit cell. Translation of the unit cell in 3D creates a grid-like matrix or crystal lattice, where each lattice point occupies an identical chemical environment. We can see the periodicity of the crystal by looking at the crystal lattice, as well as the crystal’s reference axes. The lattice points also describe the types of symmetry or order that we observe among the atoms. So, you can think of the unit cell as a nanometer-sized memory unit that encodes all of the information about the arrangement of atoms that is needed to create the crystal. The unit cell can adopt 1 of 7 different crystal system geometries, which is also mirrored in the external shape of the crystal. For example, these cubic crystals of NaCl are constructed with a cubic unit cell. So, a crystal is also a fractal.

The atomic structure of Quartz crystals, we see that are built from molecules of Silicon Dioxide, which form additional covalent bonds to produce Silicon-Oxygen tetrahedra. In this chemical structure, Oxygen has a partial negative charge, while the central Silicon atom is partially positive; however, the Silicon-Oxygen tetrahedra is symmetrical with identical bond lengths and angles, so the positive and negative charges cancel out. This Silicon-Oxygen tetrahedron is the fundamental structural unit of the crystal, which covalently links together to form a crystal lattice with hexagonal geometry. The hexagonal symmetry confers a Trigonal/Hexagonal unit cell geometry, which is reflected holographically in the external, hexagonal shape of the natural Quartz crystal.

The crystal lattice is assembled through a two-step crystallization process, including nucleation followed by crystal growth. We can visualize this process from a thermodynamics perspective to understand how energy minimization drives the transition between a liquid phase to solid, crystalline phase. In the first step of nucleation, single molecules in a liquid phase self-associate to balance attractive and repulsive forces of positive and negative charges and electrons. These critical aggregates form molecular interactions to produce the symmetrical atomic arrangement of the unit cell, at which point the crystallization reaction crosses the energy barrier to initiate crystal growth. The resulting stable nuclei contains the unit cell memory unit that is used to guide molecules to build the crystal lattice and increase the dimensions of the crystal until it reaches a final energy minimized state. The liquid-to-crystalline phase transition can also be visualized as a Phase Diagram, which shows how the physical parameters of the environment affect the crystallization or ordering of the crystal lattice, which affects the overall crystal quality. Transparent crystals indicate a well-ordered internal structure, while opaque crystals indicate the presence of impurities or disorder in the crystal lattice. The order, geometry, and internal structure of the crystal lattice ultimately determines the emergent energetic properties of the crystal.

So how exactly does a well-ordered crystal lattice transfer energy? The key is in its atomic symmetry. If we take a closer look, the quartz crystal lattice contains a vertical C-axis that is perpendicular to 3 identical A-axes. If we view along the C-axis, we observe a 2D projection of hexagonal geometry with hexagonal internal symmetry, and this pattern produces optical properties of the crystal. If we rotate 90 degrees and view along the A-axis, we observe a 2D projection of covalently linked vertical helices of tetrahedra. The symmetry of the A-axis produces a very important property, called piezoelectricity, which is the conversion of mechanical stress, like pressure and sound, into electricity. The piezoelectricity of the A-axis creates a mechanism for energy transfer within the quartz crystal. In its initial state, the Silicon-oxygen tetrahedron are perfectly symmetrical; however, when pressure is applied, the tetrahedral geometry is deformed and the atoms shift, creating an imbalance in charge. This creates a separation of positive and negative charge that is propagated along the vertical helices to opposite faces of the crystal lattice. This separation of charge creates voltage, which allows the flow of electrons or electricity. The A-axis also produces inverse piezoelectricity, meaning that electromagnetic frequencies or voltage will cause the crystal to vibrate at its natural frequency, known as the resonant frequency. The inverse piezoelectric mechanism of vibration allows crystals to selectively resonate with a desired frequency in a person’s electromagnetic biofield and filter out any dissonant frequencies, therefore restoring the biofield to a coherent state.

## *References*

[1] Kattke et al. 2019. An Overview of Crystal Technology for Energy Healing and Biofield Research. 2019 IONS Possibility Accelerator.

# Experimental Protocols

## ***Liquid Crystal Quantum Sensor***

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### *The Spiritual Science of Liquid Crystal Imprinting*

According to Sarah Thomas with The Upper Clarity School of Stone Medicine, crystals make the intangible realms tangible [1]. Using stones and crystals, we can interact with higher frequency dimensions outside of the physical space-time reality. The crystals hold frequencies from our consciousness and the quantum field, including sound, prayer, thoughts, and intentions, and then crystallize these vibrations into form and structure in this three-dimensional reality. The crystal lattice stores the high frequency consciousness vibration and transmits it into the quantum field, where it is amplified holographically to magnetically gravitate resonating electromagnetic frequencies to manifest your desired outcome in the current space-time reality [2].

The Liquid Crystal Quantum Sensor is a cholesteryl ester-based sensor that can detect subtle energy and the powers of consciousness. Crystallographer, Marcel Vogel, first developed this liquid crystal sensor to detect subtle energy during meditation and visualization. During an experiment with intense visualization, intention, and meditation, Marcel Vogel imprinted an image of the Virgin Mary holding baby Jesus (Figure 1). This was the first direct demonstration of the power of consciousness using a liquid crystal sensor.

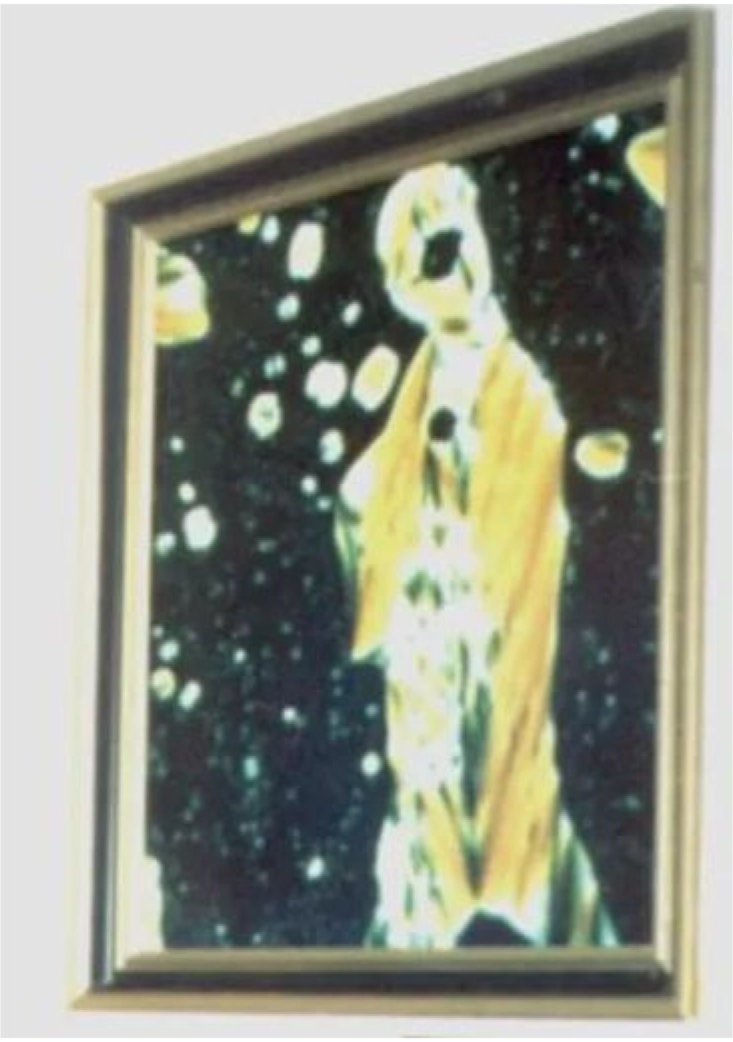


**Figure 1. Marcel Vogel's liquid crystal imprint of the Virgin Mary using meditation and visualization [3].**

## *The Science of Liquid Crystals*

The Liquid Crystal Quantum Sensor is composed of cholesteroyl esters, which are rod-shaped chemical molecules that self-assemble in a uniform way. These molecules crystallize into layers along their long axis, which then self-assemble to form vertical helices (Figure 2) [4]. The crystallized layers of cholesteroyl ester molecules absorb energy from thermal heat, which causes them to rotate and change their pitch, or the angle between adjacent molecules in the vertical helix. This shift in pitch produces a measurable change in the wavelength of light that is emitted from the cholesteroyl ester liquid crystals, which can be used to detect the presence of quantum energy, such as intention, visualization, meditation, and subtle energy from crystal technology.

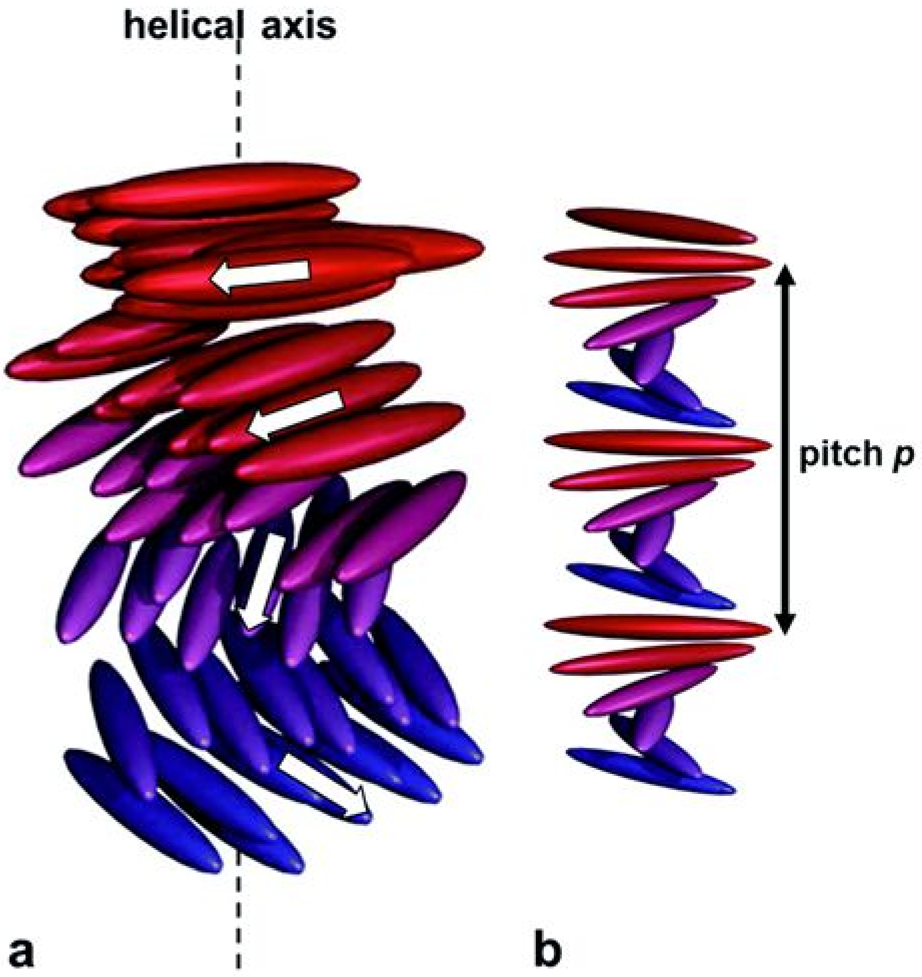


**Figure 2. Changes in helical pitch in response to absorbing quanta of energy creates a detectable shift in light wavelength emission.**

Cholesteric-phase liquid crystals contain molecules aligned in layers rotated with respect to one another (Figure 2). The rotation angle from one layer to the next increases with temperature, so the distance between layers with the same orientation, called the pitch, decreases with temperature. The helical structure selectively diffracts light according to the Bragg's Law modified by Snell's Law,

$\lambda = np(1 - \cos2\theta/n2)½$

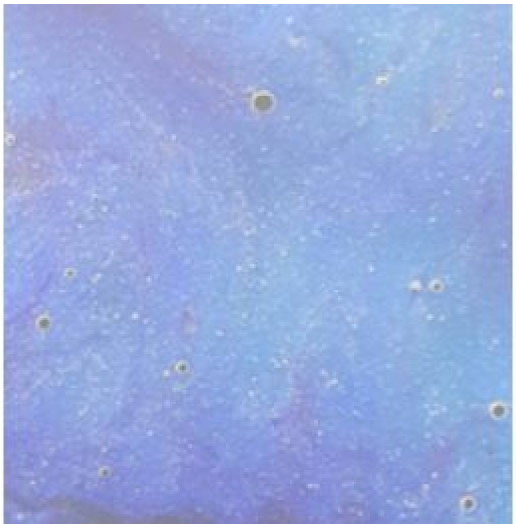
where λ is the reflected wavelength, n is the mean refractive index, p is the pitch, and θ is the angle with respect to the surface. Compressing the malleable liquid crystalline phase changes the spacing between molecules, which alters the reflected color. The wavelength of reflected light can be measured as the liquid crystal undergoes phase transitions in response to absorbing quanta of energy.

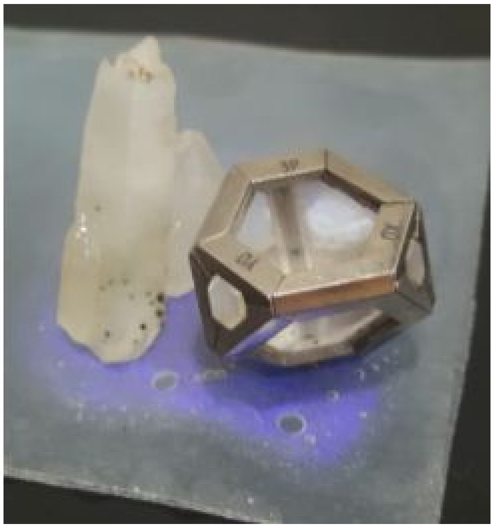
## *Quantum Experiments with the Liquid Crystal*

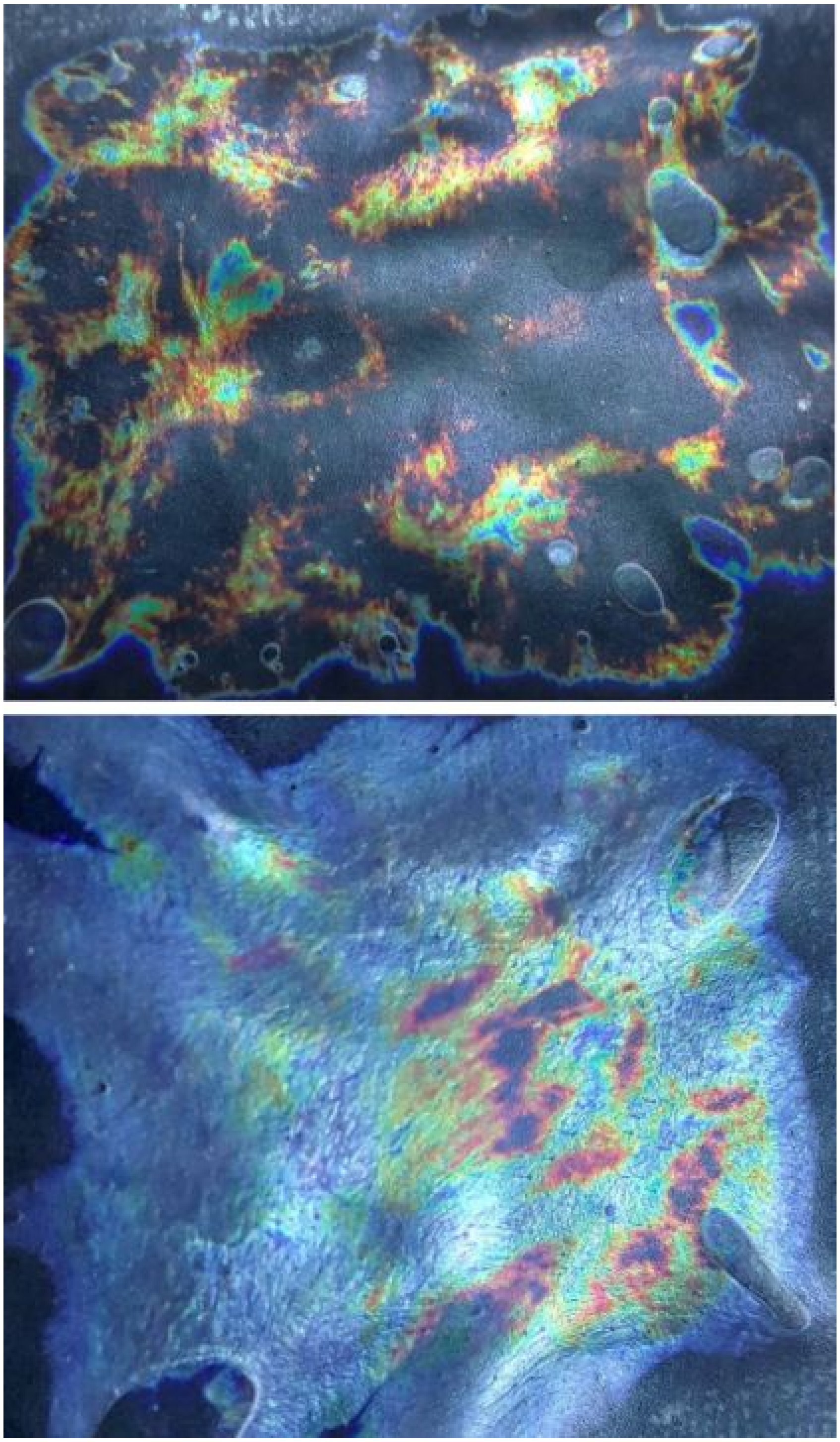
Quantum Crystallographer, Dr. Michele Kattke has reinvented the Quantum Liquid Crystal Sensor for spiritual science experiments with powers of consciousness and crystal energy [5]. The quantum energy detection mechanism occurs through color transitions, or spectral shifts of chromatic light frequencies, that are created via molecular orientation transitions triggered by thermal inputs from visualization, intention, meditation, and other subtle energy and consciousness vibrations.

Now, it's time to experiment, and the more creative your hypothesis and experimental design, the better! So, how will you test your powers of consciousness?

1. What is your hypothesis?
2. What experimental method will you use? Meditation, visualization, intention, crystal energy, or another subtle energy or power of consciousness?
3. What were the results? Was it what you expected? How do your findings fit into the context of the Quantum Worldview? What new questions and hypotheses do you have?







For more information about the Liquid Crystal Quantum Sensor, please visit: www.quantumcrystalsphere.com

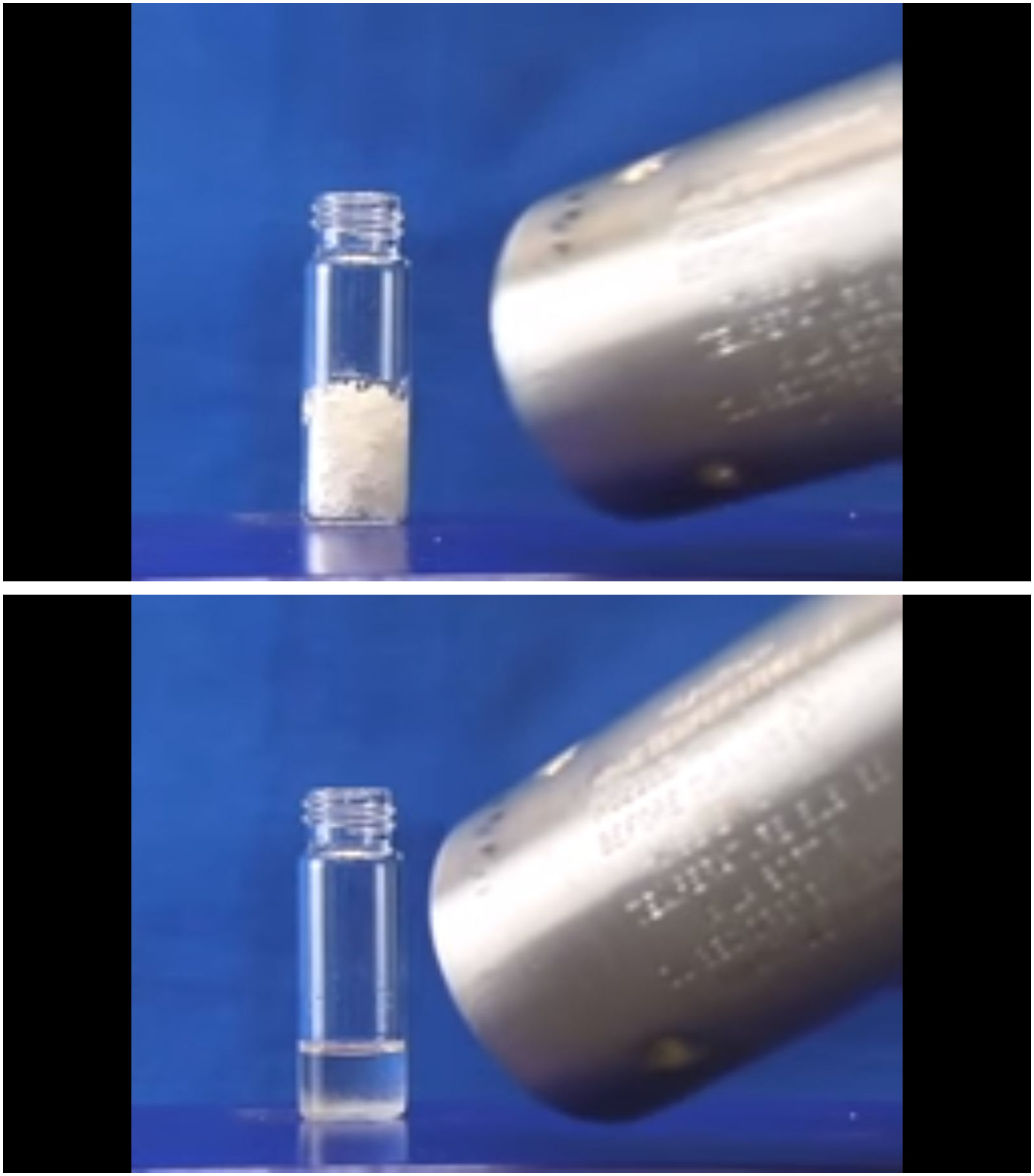
## References

[1] Sarah Thomas. 2019. Crystal Grids: Imprinting and Radionics. The Upper Clarity School of Stone Medicine. https://youtu.be/a1lbMh4QED0
[2] Michele Kattke. 2020. Crystallizing Consciousness with the Universal Creative Force of Intention. The Quantum Crystalsphere. www.researchgate.net/publication/340772456_Crystallizing_Consciousness_with_the_Universal_Creative_Force_of_Intention
[3] Robert Gilbert. Crystal and Gemstones. The Vesica Institute for Holistic Studies. https://vesica.org/
[4] George Lisensky and Elizabeth Boatman. 2005. Colors in Liquid Crystals. Beloit College. Journal of Chemical Education. 82:9.
[5] Michele Kattke. 2020. Liquid Crystal Quantum Sensor Non-local Intention Experiment. Quantum Crystalsphere. www.quantumcrystalsphere.com/event-details/liquid-crystal-quantum-sensor-non-local-intention-experiment

## Protocol

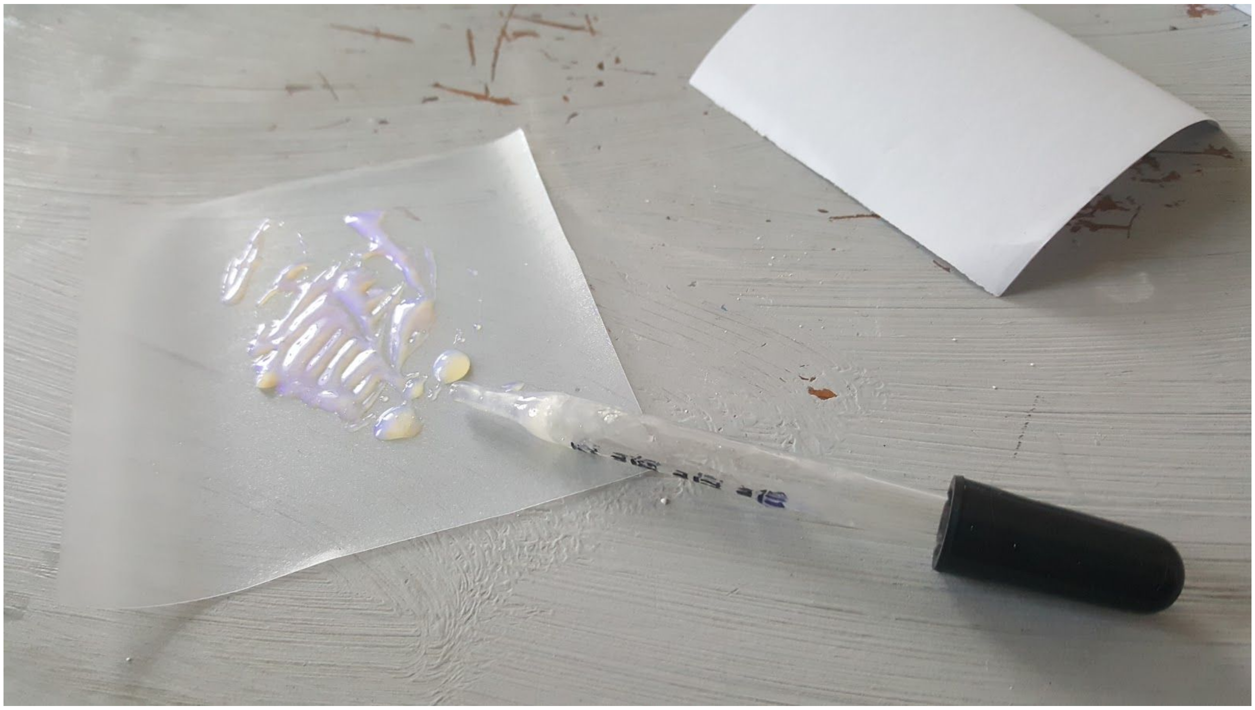
### *Preparation of the Liquid Crystal Sensor*

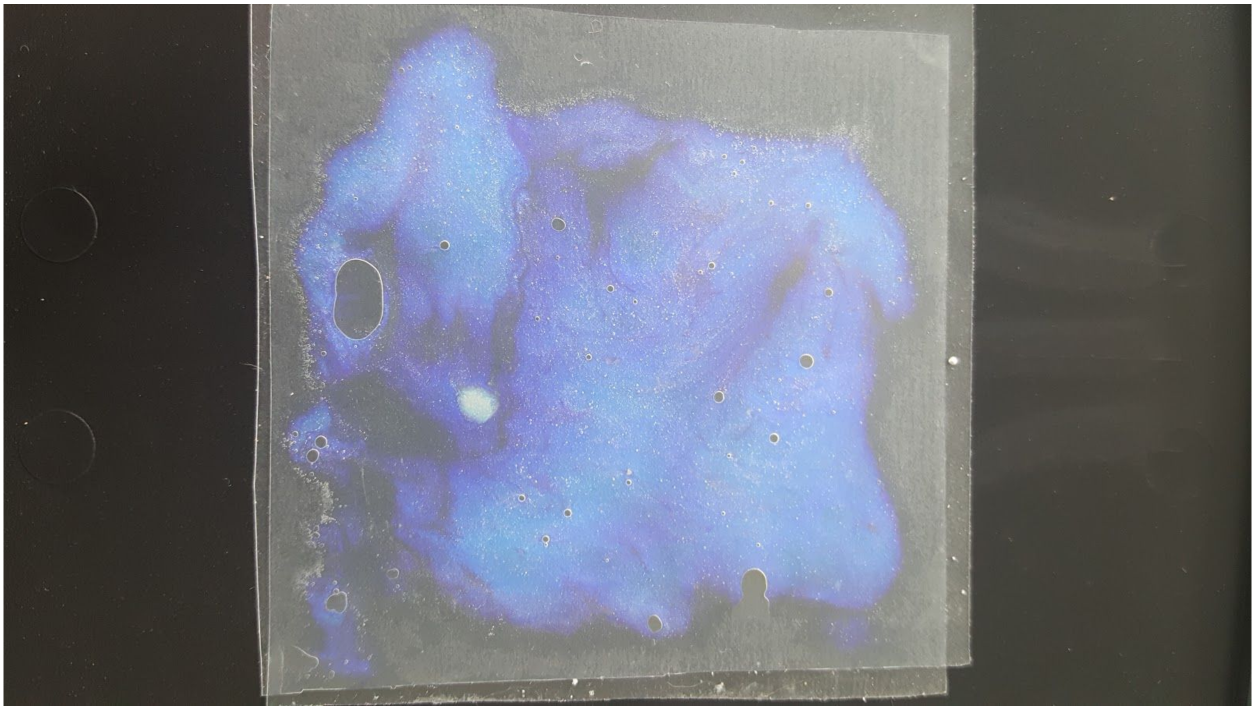
1. Apply heat directly to the glass vial of pre-dispensed liquid crystal cholesteroyl ester until the liquid crystal is completely transparent. The white, opaque powder will transition to a clear, iridescent, viscous solution; either an industrial blow dryer or boiling water can be used as a heat source.
   Note: Please take appropriate CAUTION to not burn yourself when handling the heat source.



2. Slowly transfer the liquid crystal from the glass vial into the pipette, transferring small quantities of the viscous solution at a time. Transfer the liquid crystal onto evenly distributed drops across the surface of the contact paper. Maintain a clear, untouched border of at least 1 cm along all four sides of the contact paper. Note: The viscous solution will stick to the sides of the pipette. To maximize transfer of liquid crystal from the pipette to the contact paper, please do not exceed the 0.50 mL black line indicator, and please use dropping pipette best practices.

3. Place the other piece of contact paper on top of the liquid crystal-coated contact paper to create a sandwich. Lightly press the liquid crystal into an even coat, while removing air bubbles. Firmly press along all four edges of the sandwiched contact paper to create an airtight seal to prevent moisture and air exposure.





*Quality Control of Liquid Crystal Sensor*

1. Place your finger onto the liquid crystal sensor to detect thermal changes from your body heat. What colors are the liquid crystal before and after exposure to body heat?
2. Measure the color wavelength using the spectrometer smartphone application, ASpectraMini. What are the color wavelengths before and after exposure to body heat?
3. Create a calibration curve of color wavelength vs. temperature. Monitor transition temperatures with a thermometer.

## *Intention & Heart-Brain Coherence*

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### *Intention Power of Consciousness is a Universal Creative Force*

Intention is a universal creative force that generates an energetic imprint that expresses from consciousness. In philosophy, intention is defined as a determination or will to create reality, or practically speaking, as a single-pointed resolve to focus both psychologically and philosophically on a specific goal. Intention involves coherence of the heart and mind, which then harmonizes with the energetic activity of the body to produce a result on the spiritual, energetic, and material levels of the universe. From a scientific perspective, intentions create new synaptic connections and neural circuits in the brain via neuroplasticity, which then emit frequencies based on electrical conductivity of action potentials. The frequency signature that is generated with intention or thought interacts with the quantum field via interconnected quantum-holographic networks of the mind and the universe, called the Quantum Crystalsphere, to magnetically gravitate matching frequencies across space-time [1]. The practice of intention entangles information at the quantum level, meaning that two particles across space-time are energetically linked or coupled, and the action of one particle instantaneously influences the other particle non-locally. Furthermore, if the intention is charged with emotion, the intention powerfully interacts with the quantum field, as the heart produces 60 times more powerful of an electromagnetic energy field compared to the brain [2].

### *Scientific Research on the Power of Intention*

Lynne McTaggart has extensively researched the power of intention and described her findings in two books, The Intention Experiment and The Power of Eight [3, 4]. During her initial studies on quantum physics, Lynne generated quantitative scientific evidence using water and plant experimental systems that our thoughts can structure or order the quantum field, also known as the zero point energy field [3]. In contrast to definitions of intention from philosophers, scientists characterize intention as: 1) purposeful plan of action, 2) commitment to an outcome or result, 3) projection of awareness with purpose and efficacy towards an outcome, and 4) highly motivated and targeted thoughts. Interestingly, Lynne observed that intention has a central, participatory role in creating reality and acts as a potent energy to perform work and influence the tangible world [4].

Intention has also been studied in water crystallization experiments by Dean Radin of the Institute of Noetic Sciences (IONS) and Masuro Emoto of the IHM Research Institute [5]. In 2006, these researchers performed a non-local, double-blinded experiment, in which a group of 2000 people in Tokyo, Japan performed a prayer of gratitude directed toward water in the IONS Laboratory 5000 miles away in California, United States. Microscopy images of the crystallized intentional prayer-treated and control water samples were blindly and independently scored by 100 volunteers, one water crystallization image at a time, on a scale from zero to six, where zero means “not beautiful” and six means “very beautiful.” Average ratings of the 24 intentional prayer-treated water crystals indicated that they were significantly more aesthetically appealing than crystals from the 16 untreated, control water samples (Figure 1) [5]. The quantitative results from the IONS study supports the qualitative intention-treated water crystallization images of Masuro Emoto, which compared the morphology of crystallized water from the Fujiwara Dam before and after a Buddhist monk offered a prayer (Figure 2).

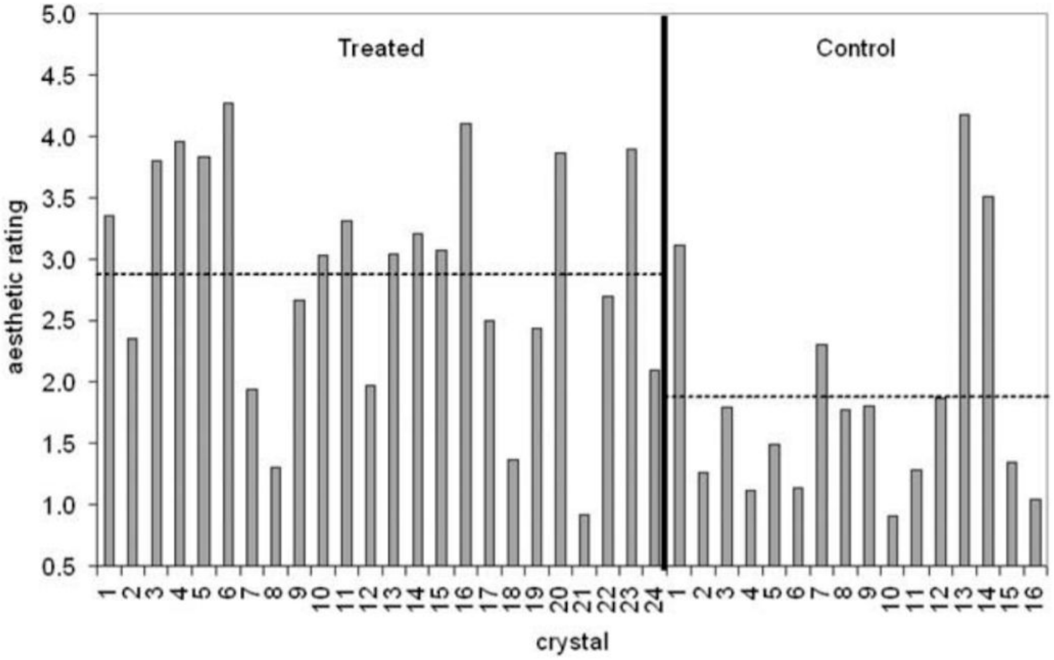

**Figure 1. Mean aesthetic ratings by 100 independent judges blind to the condition of each image, for 40 crystals blindly identified by an analyst. Grand means for the 24 treated and 16 control samples are identified with dashed lines. Figure referenced from Radin et al. 2006 [5].**

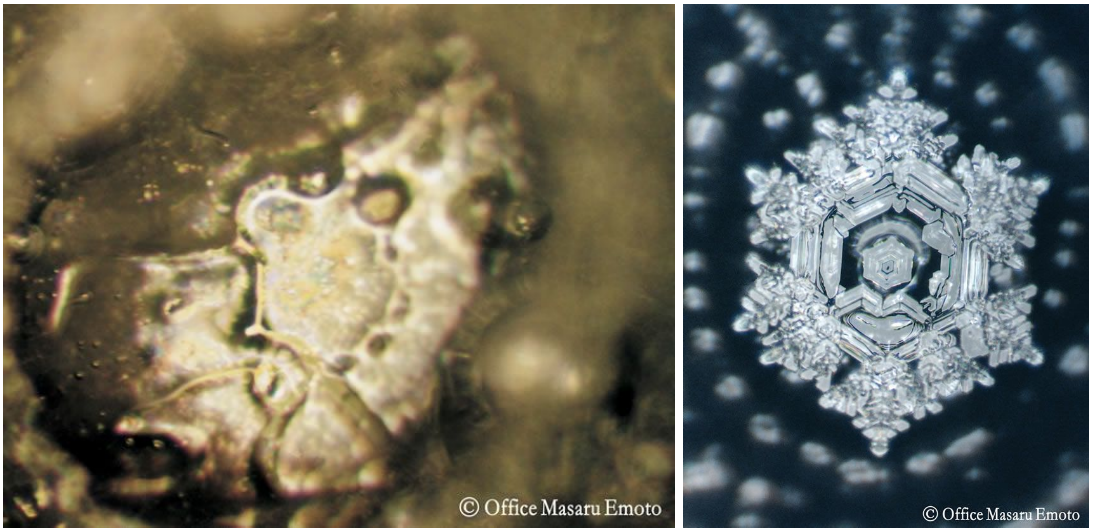

**Figure 2. The Power of Intention on the Crystallization of Water. The morphology of crystallized water from the Fujiwara Dam before (left panel) and after (right panel) a Buddhist monk offered a prayer. Referenced from Masaru Emoto Gallery of Water Crystals: [www.masaru-emoto.net/en/crystal/](http://www.masaru-emoto.net/en/crystal/).**

*Water Crystallization to Observe the Power of Intention to Affect Physical Reality*

Water is a ubiquitous system in nature that forms tetrahedral geometry within the intermolecular bonding pattern of the liquid crystal lattice phase. Upon altering physical parameters, such as temperature or pressure, water molecules will undergo phase transitions from liquid-to-solid or crystalline states, in which rearrangements of the electrostatic interactions create changes in the crystal lattice geometry (Figures 3 & 4) [7]. This phase transition from tetrahedral to hexagonal geometry of the water crystal lattice is a prime example of dynamic, energetic geometry that philosophers and spiritual scientists state is the fundamental underlying nature of reality. The alternative hydrogen bonding pattern present in ice crystals generates 6-fold symmetry, which is observed as hexagonal geometry of the ice crystal lattice or snowflakes (Figures 3 & 4) [7]. These snowflake ice crystals grow along the prism plane or C-axis of the molecular crystal lattice and form diverse morphologies, including plates, needles, stellar plates, dendrites, columns, and others, according to the environmental conditions during their crystallization (Figures 4 & 5) [7].

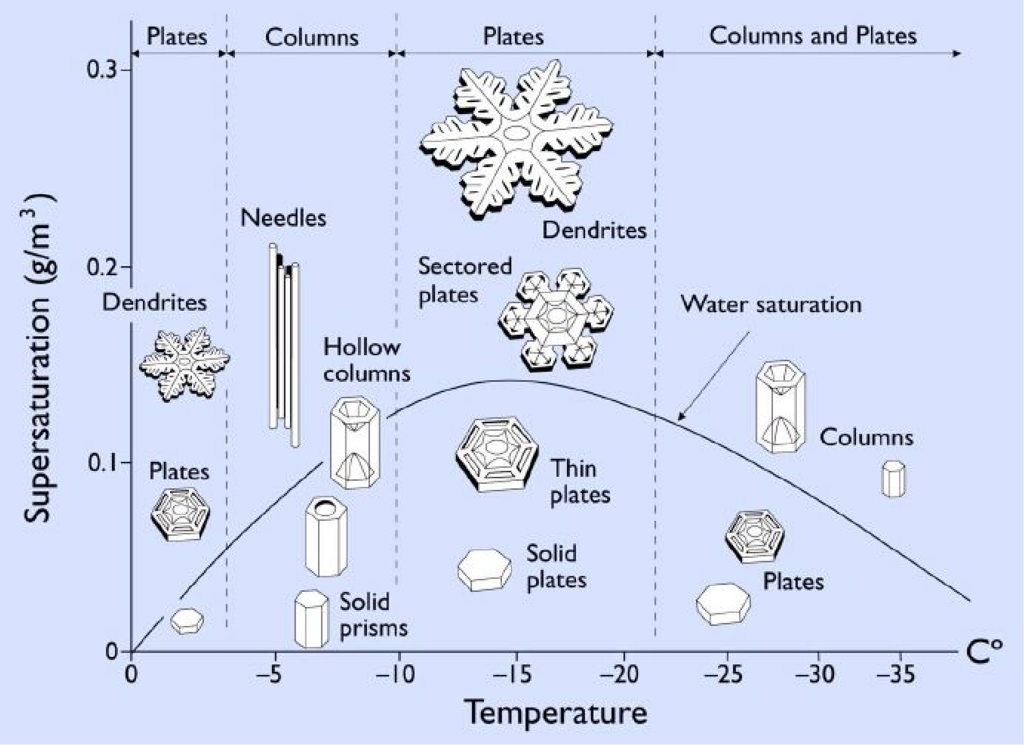

**Figure 3. The Nakaya snow crystal morphology diagram. Different snowflake ice crystals grow at atmospheric pressure as a function of temperature and water vapor supersaturation. Morphologies of snowflake crystallized water include**

**solid plates, sectored plates, dendrites, needles, hollow columns, and solid prisms. Figure referenced from Libbrecht et al. 2012 [6].**

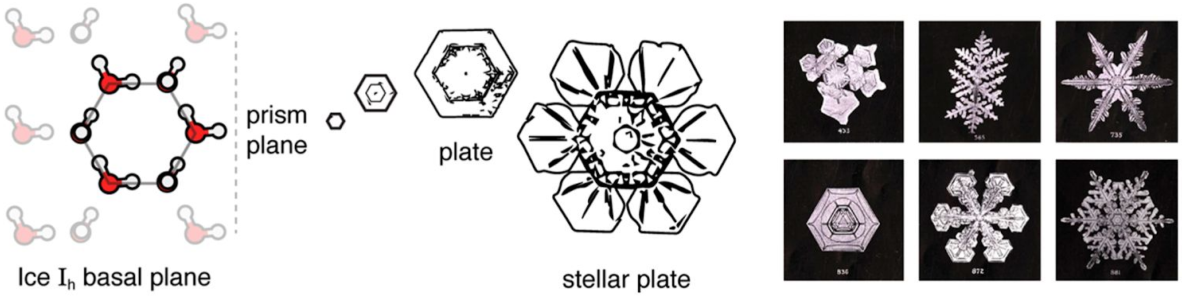

**Figure 4. Snowflakes or crystallized water reveal 6-fold symmetry due to the hexagonal structure formed by hydrogen bonding of water molecules in Ih ice crystals. Figure referenced from Brini et al. 2017 [7].**

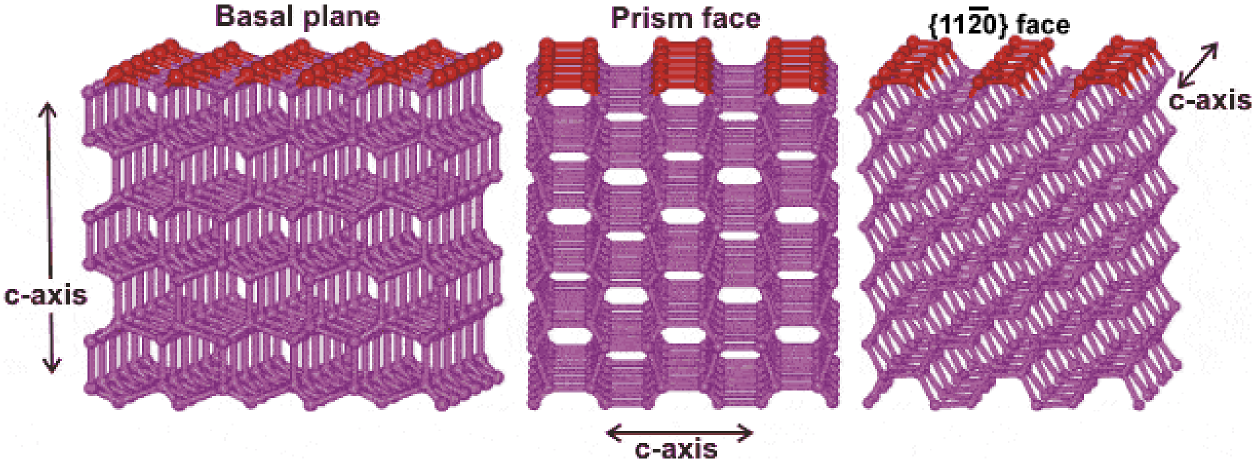

**Figure 5. A crystallographic view of the energetic geometry of water crystallization. The structure of water molecules into 6-fold hexagonal symmetry along the unit cell axes of the Ih ice crystal lattice. Snowflakes grow along the prism plane or C-axis of the lattice.**

As observed with snowflake or water crystallization, the intermolecular hydrogen bonding pattern of water transitions from tetrahedral geometry in the liquid phase to hexagonal geometry in the crystalline phase. In fact, this geometric phase transition, analogous to the energetic geometry of intention described in Daoist teachings, acts as the nucleation event for the crystallization reaction. Numerous previous studies have shown that intention acts as an intelligent energy or physical force that structures or orders water molecules. So, the energetic force of intention can be observed in real time through the mechanism of water structuring or molecular phase transition and crystallization.

## *Protocol*

As a daily manifestation practice, you can cultivate the power of intention using instructions from Lynne McTaggart's The Power of Eight book [7]. Briefly, a scientifically supported intention practice includes:

- Forming a specific, positive intention statement
- Closing your eyes, bringing attention inward, and clearing your mind of all distractions
- Focusing on your breathing while inhaling and exhaling slowly
- Cultivating the feeling of your desired outcome and imagining that this feeling is growing through your heart space as you inhale and exhale
- Imagining with all of your senses as if your desired outcome has already occured
- Remaining open to receive in your heart space

## *References*

[1] Di Base et al. (2013) Quantum Informational Self-Organization and Consciousness: A Holoinformational Model of Consciousness. Journal of Nonlocality. 2167-6283.
[2] McCraty et al. (2016) Science of the Heart, Exploring the Role of the Hearth in Human Performance. 10.13140/RG.2.1.3873.5128.
[3] McTaggart et al. (2020) Intention Experiments. https://lynnemctaggart.com/intention-experiments/.
[4] McTaggart et al. (2018) The Power of Eight: Harnessing the Miraculous Energies of a Small Group to Heal Others, Your Life, and the World.
[5] Radin et al. (2006) Double-blind Test of the Effects of Distant Intention on Water Crystal Formation. Explore 2, 408-411.
[6] Libbrecht et al. (2012) Toward a Comprehensive Model of Snow Crystal Growth Dynamics. arXiv:1211.5555v1.
[7] Brini et al. (2017) How Water's Properties Are Encoded in Its Molecular Structure and Energies. Chem. Rev. 117, 12385-12414

# ***Programming the Vogel Crystal***

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## *The Vogel Crystal: Modern Quartz Crystal Technology*

Crystallographer Marcel Vogel engineered therapeutic quartz crystals with precise resonant frequencies by changing the crystal's external shape or macroscopic morphology. He determined that the resonant frequency of a crystal can be tuned by optimizing the type of atoms or elements incorporated into the crystal lattice, the orientation of the atoms or internal symmetry, and the number of unit cells or volume along each of the crystal axes, which is determined by the dimensions, number of faces, and termination angles. Specifically, he cut along the axes of the crystal lattice to create 4- or 13-sided crystals with pyramidal terminations, and these parameters could be customized to produce a healer's signature resonant frequency, to amplify energy to different intensities, and to produce ideal energetic properties for meditation and healing. He also developed a reproducible method to energetically charge the crystal using pranic energy linked to the oxygen carrier of the breath and consciousness focused at the vibration of love and well-being.

Crystallographer, Marcel Vogel, experimented a great deal with macroscopically shaping quartz crystal to tune its properties for healing and meditation. Specifically, he engineered double-terminated 4,6,7,8-sided crystals to create geometric resonance and transfer electromagnetic charge to water molecules in the physical body in order to structure and store healing vibrations. Generally, the quartz crystal was engineered with double terminations to act as an unidirectional energy transducer. The base termination was cut at a 51.5 degree angle, and the tip termination angle was cut at a higher, more acute angle and customized to resonate with the individual's resonant frequency. The number of sides are directly related to the charge capacity of the crystal, with an increasing number of facets corresponding to increased charge capacity. The number of facets were cut to match resonance frequency of the water molecule.

## *Protocol*

- Visualize the crystal and let your breath out into the crystal
- Feel the vibration of the crystal, the beauty, pattern, force of the crystallographic form
- Breath in love and light
- Breath out and release all tension and resistance into peace and harmony
- Focus on the purpose or intention, what you want to know, experience, integrate into practice

- Breath in (inhale), hold breath, and release from the crystal
- Hold opposite pairs of faces with one hand
- Hold the termination tips with the other hand
- Draw breath in through the diaphragm and tune to the crystal
- Visualize image of well being and love
- Pulse breath (exhale)

The crystal lattice is a memory unit that can be programmed with intention power of consciousness. Atoms of the crystal lattice oscillate and absorb signature energetic frequency via life force and biofield (physical, emotional, mental, spiritual activity) transferred on oxygen.

## *References*

[1] Vogel, M. Therapeutic Use of Crystals, Part 1. https://youtu.be/fXsxI72QtWI
[2] Vogel, M. Therapeutic Use of Crystals, Part 2. https://youtu.be/cwMi0bD8enc
[3] Vogel, M. Therapeutic Use of Crystals, Part 3. https://youtu.be/tJioBfgO6RQ
[4] Vogel, M. Therapeutic Use of Crystals, Part 4. https://youtu.be/jw3904fU9NA
[5] Vogel, M. Crystal Usage Technique 1. https://youtu.be/3xSWfa3sPkY
[6] Vogel, M. Crystal Usage Technique 2. https://youtu.be/1icZ5z_Huqw

# ***Scientific Meditation***

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## *Background*

Several scientific techniques that have been used during meditation to access the zero point quantum energy field, include: 1) tension and relaxation techniques to remove energy from peripheral nerve endings, 2) breathing techniques to regulate the circulation of prana, 3) moral and spiritual actions of self-reflection and unselfishly helping others, and 4) scientific meditation while concentrating at the point between the eyes or the ajna chakra, which reflects the light of pranic energy entering at the medulla oblongata. By practicing scientific meditation, we can spiritualize body, mind, and life to bring ourselves to a higher plane of consciousness and vibration and create experiences of love, peace, joy, and bliss.

## *Protocol*

### *Tension and Relaxation to direct energy to the Cerebrospinal Axis*

- Inhale and tense, hold for 6 seconds
- Double exhale and relax fully
- Repeat 3-6x
- Deep breath without tension, release the breath
- Let breath flow naturally
- Talk to the divine in the language of your heart

### *Correct Posture of the Spine*

- Erect spine with no kinks so that the energy can flow through the chakras of the spine
- Comfortable posture to remain still for extended periods of time
- Legs cross-legged OR seated in chair
- If seated in a chair, back should not touch the back of the chair and feet are firmly on the floor with thigh parallel to the floor
- Place hands with palms upturned at the juncture between thighs and waist
- Shoulders back to open the chest
- Chin parallel to the floor

*Attention and Concentration at the Ajna Chakra Energy Center or Spiritual Eye*

- Place attention on the divine within ourselves
- Feel connection with the divine in your heart with sincere feeling
  Close eyes
- Lift eyes without strain and place inner gaze in between the eyebrows
- Spiritual eye is the center of will and concentration, manifestation of krishna consciousness
- Spiritual eye is a golden ring, dark opal center, with silver star in the center
- Concentrate within the spiritual eye and relax into the center to experience stillness

*Circulate Prana with the Breath*

- Inhale slowly and deeply for 20 seconds and visualize pranic energy flowing up the spine to the 3rd eye chakra
- Hold for 20 seconds to allow the oxygen to be fully absorbed by the blood capillaries in the lungs
- Exhale slowly for 20 seconds and visualize pranic energy flowing down the spine to the root chakra
- Repeat ~20 cycles while placing awareness on the breathing rhythm

## *References*

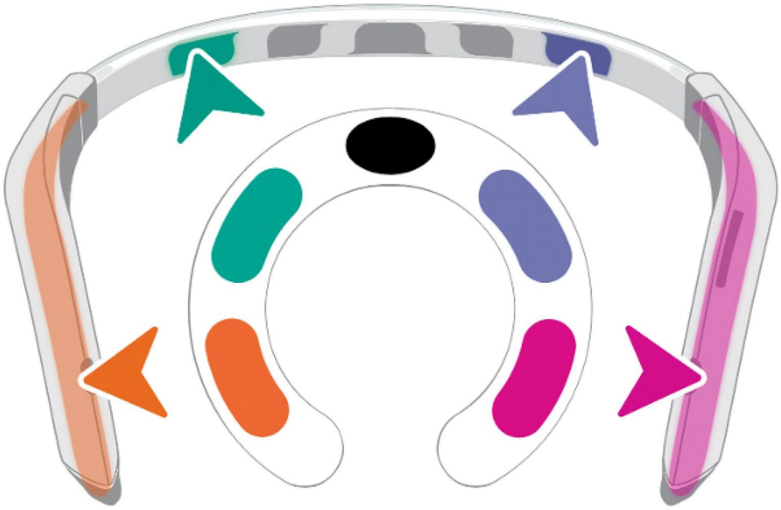
[1] Yogananda et al. Paramahamsa Yogananda's Self-Realization Fellowship Lessons. https://yogananda.org/lessons

## *Meditation EEG Collection Tutorial*

1) Please download the Mind Monitor App.

2) Please turn on your Muse2 headband.

3) Please place the Muse2 EEG headband across your forehead with the loops behind your ears, ensuring that all 4 sensors have skin contact as shown below.



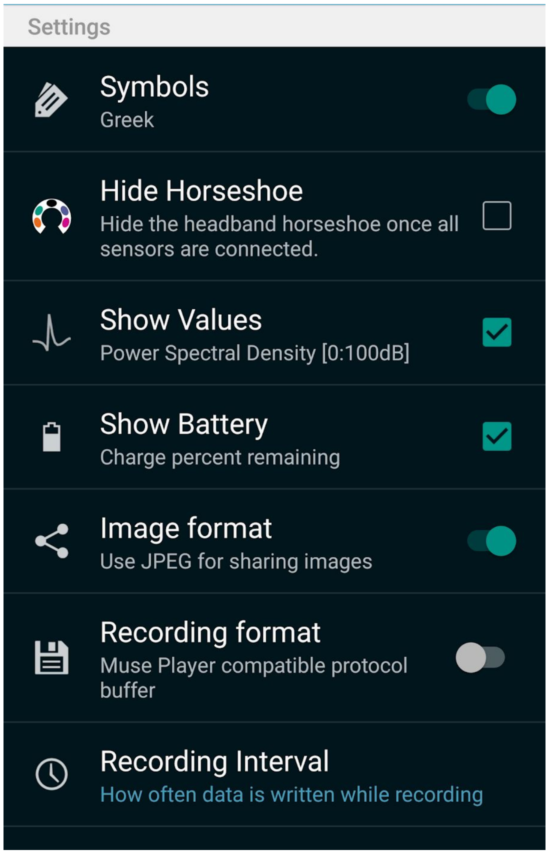
All four EEG sensors should be fully colored in to successfully sync with the MindMonitor app. Not getting a good signal? Here are some tips for troubleshooting:

- Adjust the headband around the ears and middle of the forehead. After making a fit adjustment, relax for a moment afterward in stillness to give the signal time to settle.
- Relax your face, jaw and keep your eyes closed.
- Wipe your skin with a damp cloth as oils on the skin can block the sensors.
- Wipe the sensors with a damp cloth or a finger dipped in water.
- You can read the full Quickstart guide for Muse2 here: [https://choosemuse.com/blog/starter-guide/](https://choosemuse.com/blog/starter-guide/)

4) Please select the EEG data collection settings listed below for your mobile device:

Android: Please update the settings before each meditation session.

- Under Settings, update “Recording Format” to Muse Player compatible protocol buffer (not Excel compatible CSV)
- Under Settings, update “Graph Type” to Raw EEG
- Under Wave Types (Raw), update to “All Sensors”
- Please ensure that all options under “Wave Types (Absolute)” are selected



Settings

Symbols
Greek

Hide Horseshoe ☐
Hide the headband horseshoe once all sensors are connected.

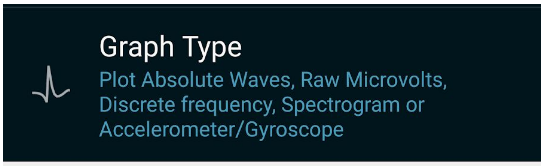
Show Values ☑
Power Spectral Density [0:100dB]

Show Battery ☑
Charge percent remaining

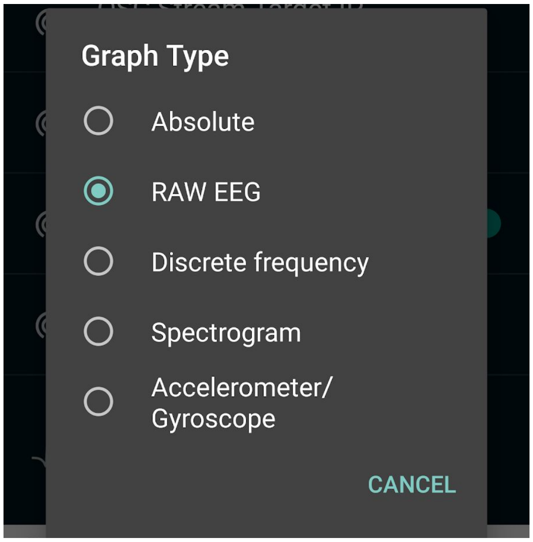
Image format
Use JPEG for sharing images

Recording format
Muse Player compatible protocol buffer

Recording Interval
How often data is written while recording

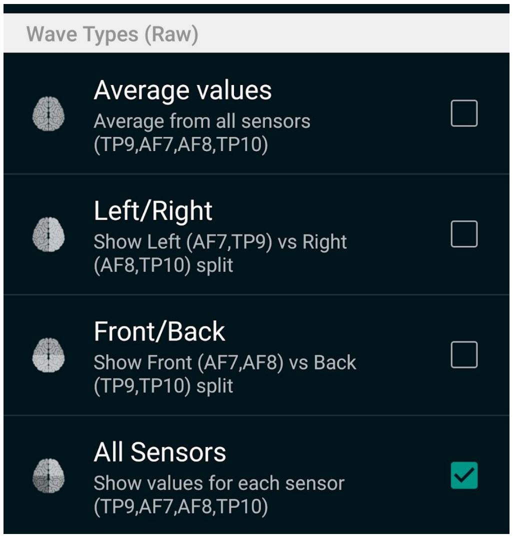


Graph Type
Plot Absolute Waves, Raw Microvolts, Discrete frequency, Spectrogram or Accelerometer/Gyroscope



Graph Type

○ Absolute
● RAW EEG
○ Discrete frequency
○ Spectrogram
○ Accelerometer/ Gyroscope



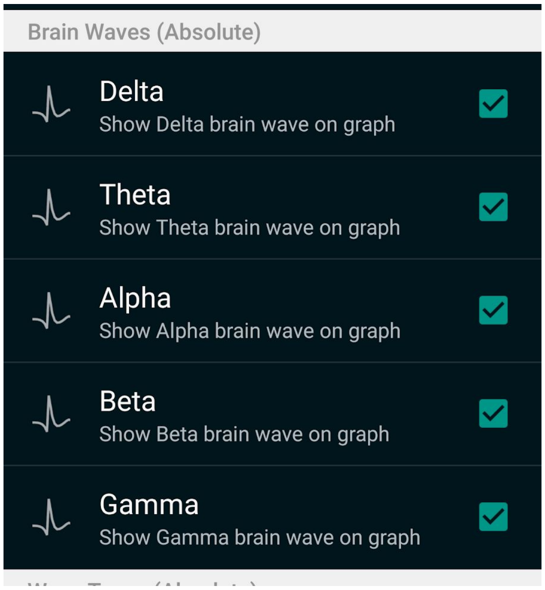
Wave Types (Raw)

Average values
Average from all sensors (TP9,AF7,AF8,TP10) ☐

Left/Right
Show Left (AF7,TP9) vs Right (AF8,TP10) split ☐

Front/Back
Show Front (AF7,AF8) vs Back (TP9,TP10) split ☐

All Sensors
Show values for each sensor (TP9,AF7,AF8,TP10) ☑



Brain Waves (Absolute)

Delta
Show Delta brain wave on graph ☑

Theta
Show Theta brain wave on graph ☑

Alpha
Show Alpha brain wave on graph ☑

Beta
Show Beta brain wave on graph ☑

Gamma
Show Gamma brain wave on graph ☑

iPhone: Please sign into the Dropbox account before collecting EEG data.

- Under Settings, update “Graph Type” to Raw EEG
- Also under Settings, update “Recording Upload” to “DropBox”
- Also under Settings, update “Recording Format” to “Muse” (not “CSV”)
- Also under Settings, update “Filename prefix” to “ID_xxx” and insert your unique study id number in place of “xxx”.
- Please ensure that all options under “Brain Waves (Absolute)” are selected
- Under Wave Types (Raw), update to “All Sensors”

5) Please record a baseline reading with the Muse2 headband and Mind Monitor app using the following technique:

- Please check that the correct EEG data collection settings are selected and press the record button on the MindMonitor app navigation bar.
- Please keep your eyes open and your mind clear of all distractions.
- Breathe slow and rhytmically with 5 sec inhale and 5 sec exhale, while focusing on your heart center and cultivating feelings of gratitude, appreciation, love, care, and compassion. This is the heart-brain coherence technique.
- Do not try to meditate during the calibration and baseline recording.
- Maintain the Heart-Brain Coherence technique for 5 mins or until a steady horizontal EEG reading is obtained.
- Press the Record button to end the recording and upload your EEG data.

6) Please upload your EEG data to the cloud folder.

Thank you for completing the EEG Data Collection Training Tutorial! If you have any questions, please reference the FAQs. Have a blissful meditation!

## *FAQs*

- ☐ **Where do I download the Mind Monitor app?**
  https://mind-monitor.com/

- ☐ **Which EEG graph type should I be recording in Mind Monitor?**

Please select “Raw EEG” for the EEG graph type.
Please select “All Sensors” for the Wave Types (Raw).
Please select “Muse Player compatible protocol buffer” for the Recording Format. Please do no collect EEG in the CSV format.

- ☐ **How should the Muse2 Sensor calibration be completed?**

Please reference the EEG Data Collection Tutorial:

1) Double check the EEG data collection settings and press the record button on the MindMonitor app navigation bar.
2) Please keep your eyes open and your mind clear of all distractions.
3) Breathe slow and rhytmically with 5 sec inhale and 5 sec exhale, while focusing on your heart center and cultivating feelings of gratitude, appreciation, love, care, and compassion. This is the heart-brain coherence technique.
4) Do not try to meditate during the calibration and baseline recording.
5) Maintain the Heart-Brain Coherence technique for 5 mins or until a steady horizontal EEG reading is obtained.
6) Press the Record button to end the recording and upload your EEG data.

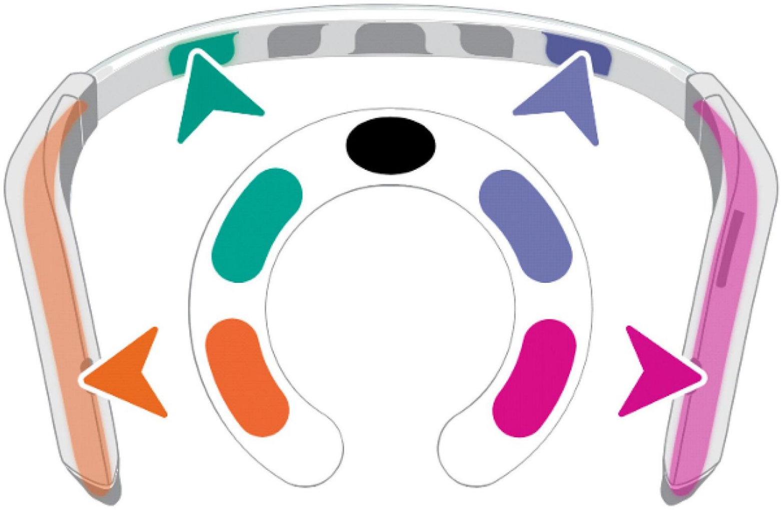
Please refer to the following resources for syncing and calibrating the Muse2 headband with Mind Monitor:

- Video on Muse calibration - Easy mode, keep eyes open; clear mind
- Things to avoid with the Muse (#1, #3 @ 3min)
- Calibrate and test with breathing
- Learn more about Mind Monitor EEG graphs

- ☐ **I have had a lot of issues getting the purple sensor to show as full.**

Not getting a good signal? Here are some tips for troubleshooting:

- Adjust the headband around the ears and middle of the forehead. After making a fit adjustment, relax for a moment afterward in stillness to give the signal time to settle.
- Relax your face, jaw and keep your eyes closed.
- Wipe your skin with a damp cloth as oils on the skin can block the sensors.
- Wipe the sensors with a damp cloth or a finger dipped in water.
- You can read the full Quickstart guide for Muse2 here: https://choosemuse.com/blog/starter-guide/

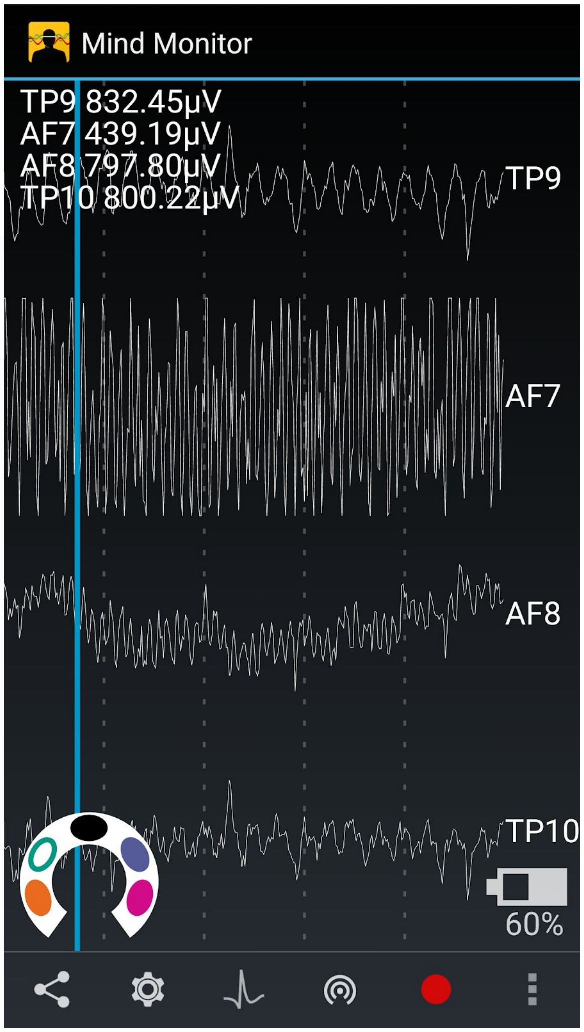


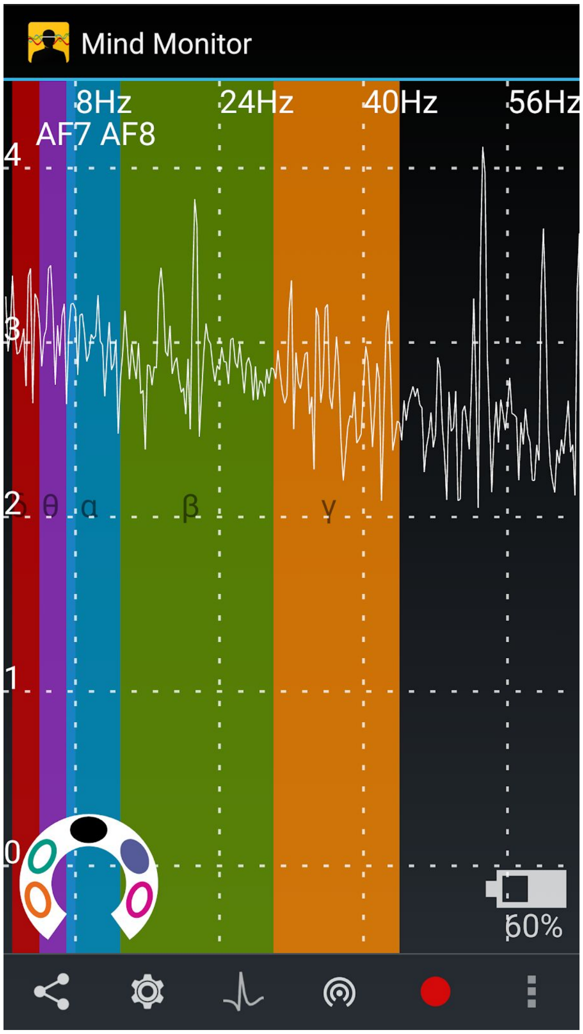
❑ **How should I save my EEG data from MindMonitor?**

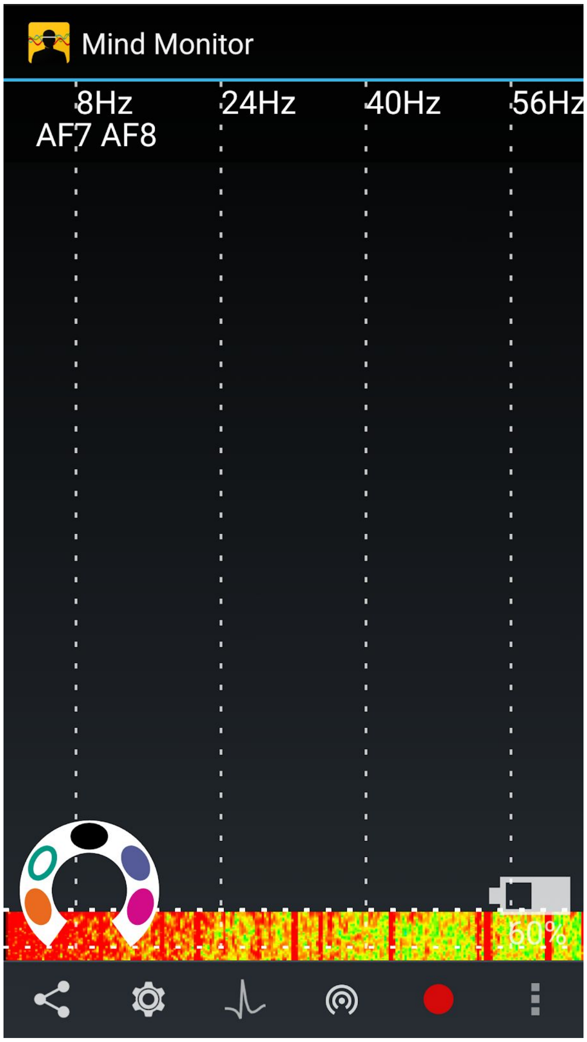
Please enable your Bluetooth on your mobile device.
iPhone users: Please sign into Dropbox before recording EEG data. EEG data will not save locally on iPhone device.
Android users: Please select the DropBox option to upload your EEG data at the end of the meditation session.

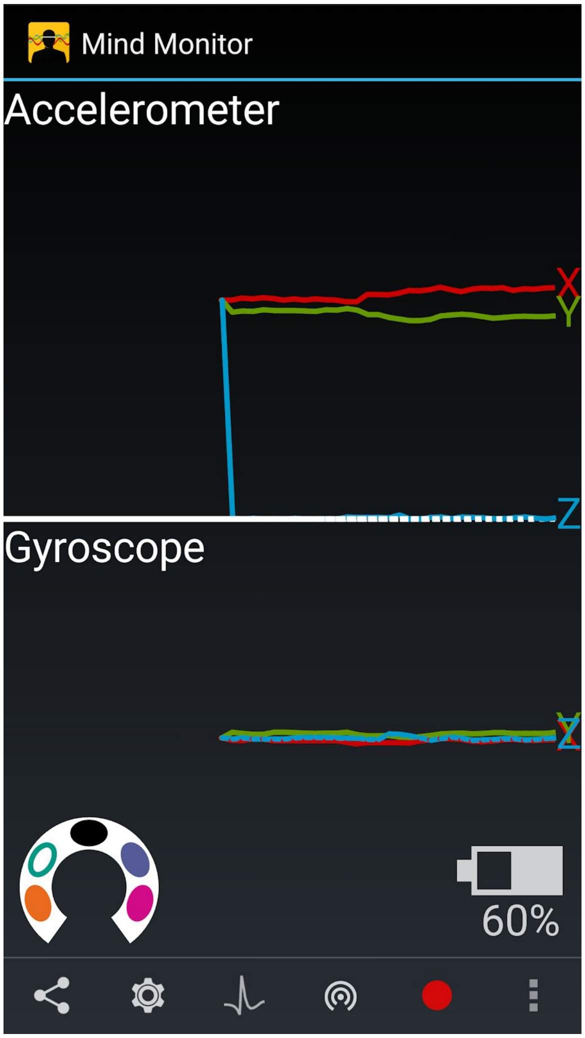
❑ **Which EEG data display setting is best when collecting data during a meditation session?**

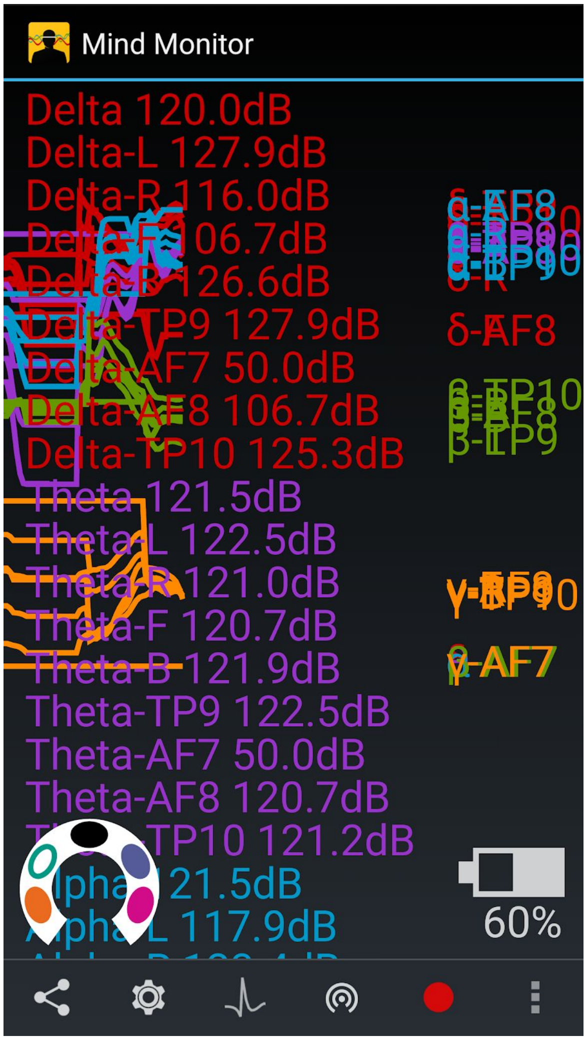
You may select whichever brainwave bandwidth display you prefer. You can scroll through real time EEG graph options using the central “wave peak” icon at the bottom of the MindMonitor application. The display options include:


Mind Monitor
TP9 832.45µV
AF7 439.19µV
AF8 797.80µV
TP10 800.22µV
TP9
AF7
AF8
TP10
60%


Mind Monitor
8Hz
24Hz
40Hz
56Hz
AF7 AF8
4
3
2
1
0
δ θ α β γ
60%


Mind Monitor
8Hz
24Hz
40Hz
56Hz
AF7 AF8
60%


Mind Monitor
Accelerometer
X
Y
Z
Gyroscope
Y
Z
60%



Delta 120.0dB
Delta-L 127.9dB
Delta-R 116.0dB
Delta-F 106.7dB
Delta-B 126.6dB
Delta-TP9 127.9dB
Delta-AF7 50.0dB
Delta-AF8 106.7dB
Delta-TP10 125.3dB
Theta 121.5dB
Theta-L 122.5dB
Theta-R 121.0dB
Theta-F 120.7dB
Theta-B 121.9dB
Theta-TP9 122.5dB
Theta-AF7 50.0dB
Theta-AF8 120.7dB
T TP10 121.2dB
lpha 21.5dB
Alpha-L 117.9dB

# Experiments & Laboratory Report

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# Reflection & Notes